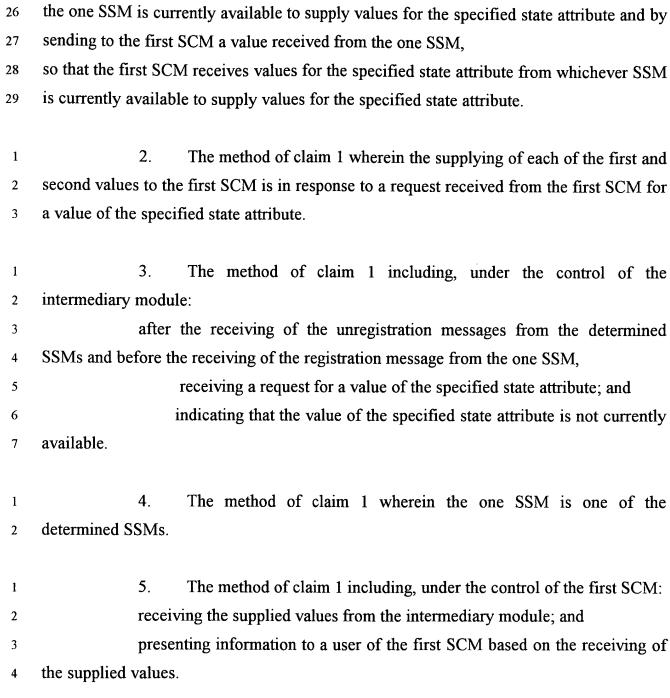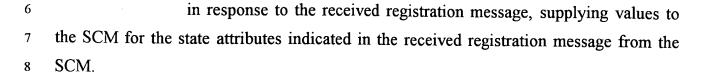CLAIMS

We claim:

1   1.   A method in a wearable computer for providing information about a

2   current state of a user of the wearable computer, the current state modeled with multiple

3   state attributes, the wearable computer executing a plurality of state server modules

4   (SSMs) to supply values for the state attributes, executing a plurality of state client

5   modules (SCMs) to receive and process values for the state attributes, and executing an

6   intermediary module to facilitate exchange of state attribute values, comprising:

7   under control of each of the executing SSMs, sending to the intermediary

8   module a registration message indicating a current availability of the SSM to supply

9   values for an indicated one of the state attributes;

10   under control of a first of the executing SCMs, sending to the intermediary

11   module a registration message indicating a current desire of the first SCM to receive

12   values for a specified one of the state attributes; and

13   under control of the intermediary module,

14   receiving the sent registration messages from the SSMs and the first

15   SCM;

16   supplying a first value for the specified state attribute to the first SCM

17   by determining based on the received registration messages at least one of the SSMs that

18   is currently available to supply values for the specified state attribute and by sending to

19   the first SCM a value received from one of the determined SSMs;

20   receiving an unregistration message from each of the determined

21   SSMs indicating a current unavailability to supply values for the specified state attribute;

22   receiving from one of the SSMs a registration message indicating a

23   current availability to supply values for the specified state attribute; and

24   supplying a second value for the specified state attribute to the first

25   SCM by determining based on the received registration and unregistration messages that

26 the one SSM is currently available to supply values for the specified state attribute and by

27 sending to the first SCM a value received from the one SSM,

28 so that the first SCM receives values for the specified state attribute from whichever SSM

29 is currently available to supply values for the specified state attribute.

1   2.   The method of claim 1 wherein the supplying of each of the first and

2   second values to the first SCM is in response to a request received from the first SCM for

3   a value of the specified state attribute.

1   3.   The method of claim 1 including, under the control of the

2   intermediary module:

3   after the receiving of the unregistration messages from the determined

4   SSMs and before the receiving of the registration message from the one SSM,

5   receiving a request for a value of the specified state attribute; and

6   indicating that the value of the specified state attribute is not currently

7   available.

1   4.   The method of claim 1 wherein the one SSM is one of the

2   determined SSMs.

1   5.   The method of claim 1 including, under the control of the first SCM:

2   receiving the supplied values from the intermediary module; and

3   presenting information to a user of the first SCM based on the receiving of

4   the supplied values.

1   6.   The method of claim 1 including, under the control of the

2   intermediary module:

3   for each of the executing SCMs,

4   receiving a registration message from the SCM indicating a current

5   desire to receive values for at least one of the state attributes; and

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6   in response to the received registration message, supplying values to

7 the SCM for the state attributes indicated in the received registration message from the

8 SCM.

1   7.   The method of claim 1 wherein at least some of the SSMs are

2 available to supply values for additional state attributes of a current state other than for

3 the user, and wherein the intermediary module additionally sends values for the

4 additional state attributes to SCMs based on received registration messages from those

5 SCMs indicating a current desire to receive values for at least one of the additional state

6 attributes.

1   8.   A method in a computer for providing information about a current

2 state that is modeled with multiple attributes, the method comprising:

3   receiving from a first source an indication of an ability to supply values for

4 an indicated one of the state attributes of the modeled current state;

5   after receiving an indication from a client for a value of the one attribute,

6 supplying to the client a value for the one attribute received from the first source;

7   after the supplying of the value received from the first source, receiving

8 from a second source an indication of an ability to supply values for the one attribute;

9   after receiving an indication from the client for a value of the one attribute,

10 supplying to the client a value for the one attribute based on values received for the one

11 attribute from the first and second sources;

12   after the supplying of the value based on the values received for the one

13 attribute from the first and second sources, receiving from the first source an indication of

14 an inability to supply values for the one attribute; and

15   after receiving an indication from the client for a value of the one attribute,

16 supplying to the client a value for the one attribute received from the second source.

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1   9.   The method of claim 8 wherein the receiving of a value for the one
2   attribute from the first source includes receiving descriptive information about the
3   received value.

1   10.   The method of claim 9 wherein the descriptive information includes
2   a time at which the received value is most accurate.

1   11.   The method of claim 9 wherein the descriptive information includes
2   a confidence factor indicating a likelihood of accuracy of the received value.

1   12.   The method of claim 9 including supplying the descriptive
2   information about the received value to the client.

1   13.   The method of claim 8 wherein the supplying of a value for the one
2   attribute to the client includes supplying an indication of the source from which the
3   supplied value was received.

1   14.   The method of claim 8 wherein a received indication from the client
2   for the value of the one attribute additionally include an indication of a source for the
3   value, and wherein the value of the one attribute that is supplied to the client in response
4   is received from the indicated source.

1   15.   The method of claim 8 wherein the supplied value based on the
2   values received from the first and second sources is a mediated value.

1   16.   The method of claim 8 including, before supplying a value to the
2   client:
3   determining whether the value to be supplied satisfies a criteria indicated
4   for the requested value; and

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5   when it is determined that the value does not satisfy the indicated criteria,

6   requesting at least one of the first and second sources to supply a value

7   for the one attribute that satisfies the indicated criteria;

8   receiving in response to the requesting at least one additional value for

9   the one attribute that satisfies the indicated criteria; and

10   supplying to the client a value for the one attribute based on the

11   received additional values.

1   17.   The method of claim 8 including storing values for attributes that are

2   received from sources so that the stored values can be later supplied to clients.

1   18.   The method of claim 8 wherein the one attribute represents

2   information about a user of the computer.

1   19.   The method of claim 18 wherein the information about the user of

2   the computer indicates a modeled mental state of the user.

1   20.   The method of claim 8 wherein the one attribute represents

2   information about the computer.

1   21.   The method of claim 8 wherein the one attribute represents

2   information about a physical environment of a user of the computer.

1   22.   The method of claim 8 wherein the one attribute represents

2   information about a cyber-environment of a user of the computer.

1   23.   The method of claim 8 including:

2   after the supplying of the value that is received from the second source,

3   receiving from the second source an indication of an inability to

4   supply values for the one attribute; and

5   after receiving an indication from the client for a value of the one

6   attribute, indicating to the client that the value of the one attribute is not currently

7   available.

1   24.   The method of claim 8 including:

2   after the supplying of the value that is received from the second source,

3   receiving from the second source an indication of an inability to

4   supply values for the one attribute; and

5   after receiving an indication from the client for a value of the one

6   attribute,

7   identifying a criteria that a value to be supplied to the client is to

8   satisfy;

9   determining that a value of the one attribute which satisfies the

10   identified criteria is not available; and

11   supplying to the client a value of the one attribute which does not

12   satisfy the identified criteria.

1   25.   The method of claim 8 including:

2   after the supplying of the value that is received from the second source,

3   receiving from the second source an indication of an inability to

4   supply values for the one attribute; and

5   after receiving an indication from the client for a value of the one

6   attribute,

7   generating a value of the one attribute; and

8   supplying to the client the generated value.

1   26.   The method of claim 8 including, after receiving an indication from

2   the client for a value of a second indicated attribute, supplying to the client a value for the

3   second attribute.

1   27.   The method of claim 26 wherein the supplied value for the second
2   attribute is received from the first source.

1   28.   The method of claim 8 including, after receiving an indication from a
2   second client for a value of an attribute, supplying to the second client a value for the
3   attribute.

1   29.   The method of claim 28 wherein the attribute whose value is
2   indicated by the second client is the one attribute.

1   30.   The method of claim 8 wherein the providing of the information
2   about the modeled current state is performed by a first intermediary module, and
3   including:
4   receiving from a second intermediary module an indication of a desire to
5   perform the providing of the information about the modeled current state; and
6   in response to the received indication from the second intermediary module,
7   permitting the second intermediary module to perform future providing of the information
8   about the modeled current state.

1   31.   The method of claim 30 wherein the permitting includes supplying to
2   the second intermediary module an indication of each source which is currently indicated
3   to have an ability to supply values for at least one of the state attributes, so that the
4   second intermediary module can receive future indications of abilities and inabilities to
5   supply values for state attributes from sources.

1   32.   The method of claim 31 including:
2   before the receiving of the indication from the second intermediary module,
3   receiving from each of multiple clients an indication of a desire to receive at least one
4   value for a specified state attribute; and

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5 in response to the received indication from the second intermediary module,

6 supplying to the second intermediary module an indication of each client from whom an

7 indication of a desire to receive at least one value for a specified state attribute has been

8 received, so that the second intermediary module can receive future indications of desires

9 to receive values for state attributes from clients.

1 33. The method of claim 31 including, under control of the second

2 intermediary module, receiving the supplied indications of the sources which are

3 currently indicated to have an ability to supply values for at least one of the state

4 attributes and notifying the indicated sources to supply the future indications to the

5 second intermediary module.

1 34. The method of claim 30 wherein the permitting includes notifying

2 each source which is currently indicated to have an ability to supply values for at least

3 one of the state attributes to supply future indications of abilities and inabilities to supply

4 values for state attributes to the second intermediary module.

1 35. The method of claim 30 including:

2 before the receiving of the indication from the second intermediary module,

3 receiving from each of multiple clients an indication of a desire to receive at least one

4 value for a specified state attribute; and

5 in response to the received indication from the second intermediary module,

6 notifying each client from whom an indication of a desire to receive at least one value for

7 a specified state attribute has been received to supply future indications of desires to

8 receive values for state attributes to the second intermediary module.

1 36. The method of claim 8 wherein the received indications from the

2 first and second sources of the ability to supply values for the one attribute are

3 registration messages.

1   37.   The method of claim 36 wherein each of the received indications

2   from the client for the value of the one attribute are requests, and including receiving

3   from the client a registration message before receiving any of the requests, the registration

4   message indicating an interest of the client in receiving values for the one attribute.

1   38.   The method of claim 8 wherein security information for a source

2   must be received before any values of state attributes are received from the source.

1   39.   The method of claim 8 wherein security information for a client must

2   be received before any values of state attributes are supplied to the client.

1   40.   The method of claim 8 wherein the indications from the client for the

2   value of the one attribute are based on an indication of a desire to receive values for the

3   one attribute that is received before the receiving of the indications of ability and inability

4   to supply values from the first and second sources, and wherein the supplying of the

5   values to the client is in response to receiving of values for the one attribute from the first

6   or second sources.

1   41.   The method of claim 8 wherein the received indications from the

2   client for the value of the one attribute are requests received from the client, and wherein

3   the supplying of the values to the clients are in response to the receiving of the requests.

1   42.   The method of claim 41 including:

2   sending requests to the first or second sources for a value of the one

3   attribute in response to the receiving of the requests from the clients; and

4   receiving values for the one attribute from the first or second sources in

5   response to the sent requests.

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1   43. The method of claim 8 wherein the first source is at a location
2 remote from the computer, and wherein the indications from the first source of the ability
3 and the inability to supply values for the one attribute are received based on proximity of
4 the computer to the location of the first source.

1   44. The method of claim 8 wherein the first source is software executing
2 on the computer, and wherein the indications from the first source of the ability and the
3 inability to supply values for the one attribute are received based on availability of input
4 information to the first source.

1   45. The method of claim 8 wherein the providing of the information
2 about the modeled current state is performed by an operating system of the computer.

1   46. The method of claim 8 wherein the providing of the information
2 about the modeled current state is performed by a software module, and including, upon
3 commencement of execution of the software module, commencing execution of multiple
4 sources that are each to supply values for at least one of the state attributes.

1   47. The method of claim 46 wherein the multiple sources that are to be
2 executed are determined based on previous received indications of ability to supply
3 values for at least one state attribute.

1   48. The method of claim 8 wherein the state attributes are part of a
2 predefined taxonomy of attributes.

1   49. The method of claim 8 wherein the state attributes are dynamically
2 defined by sources who indicate an ability to supply values for the defined attributes.

1   50.   The method of claim 8 including receiving from the client an
2 indication of another state attribute and an indication that a source for a value for the
3 indicated another state attribute is to be a same source as for the supplied value for the
4 one attribute, and selecting a value to be sent to the client for the another state attribute
5 that is received from the same source.

1   51.   The method of claim 8 including receiving from the first source an
2 indication of a group of at least one authorized client, and wherein a value received from
3 the first source is supplied to the client only if the client is one of the authorized clients.

1   52.   The method of claim 8 wherein the first source includes a group of
2 instructions to be executed to produce a value for the one attribute, and including loading
3 and executing the group of instructions in response to the receiving of the indication from
4 the client for a value of the one attribute, the loading and executing so that the first source
5 can produce the first value.

1   53.   The method of claim 8 wherein receiving of the supplied value by
2 the client prompts the client to present information to a user of the client.

1   54.   A computer-readable medium whose contents cause a computing
2 device to provide information about a current state that is modeled with multiple
3 attributes, by:
4   receiving from a first source an indication of an ability to supply values for
5 an indicated one of the state attributes of the modeled current state;
6   after receiving an indication from a client for a value of the one attribute,
7 supplying to the client a value for the one attribute received from the first source;
8   receiving from a second source an indication of an ability to supply values
9 for the one attribute;

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10   after receiving an indication from the client for a value of the one attribute,

11   supplying to the client a value for the one attribute based on values received for the one

12   attribute from the first and second sources;

13   receiving from the first source an indication of an inability to supply values

14   for the one attribute; and

15   after receiving an indication from the client for a value of the one attribute,

16   supplying to the client a value for the one attribute received from the second source.

1   55.   The computer-readable medium of claim 54 wherein the computer-

2   readable medium is a memory of the computing device.

1   56.   A computer-readable generated data signal transmitted via a

2   transmission medium, the generated data signal having encoded contents that cause a

3   computer system to provide information about a current state that is modeled with

4   multiple attributes, by:

5   receiving from a first source an indication of an ability to supply values for

6   an indicated one of the state attributes of the modeled current state;

7   after receiving an indication from a client for a value of the one attribute,

8   supplying to the client a value for the one attribute received from the first source;

9   receiving from a second source an indication of an ability to supply values

10   for the one attribute;

11   after receiving an indication from the client for a value of the one attribute,

12   supplying to the client a value for the one attribute based on values received for the one

13   attribute from the first and second sources;

14   receiving from the first source an indication of an inability to supply values

15   for the one attribute; and

16   after receiving an indication from the client for a value of the one attribute,

17   supplying to the client a value for the one attribute received from the second source.

1   57.   A computing device for providing information about a current state
2 that is represented with multiple attributes, comprising:
3   an attribute mapping module that is capable of receiving from each of a first
4 source and a second source an indication of an ability to supply values for an indicated
5 one of the attributes of the current state, and that is capable of later receiving from the
6 first source an indication of an inability to supply values for the one attribute;
7   an attribute value receiver module that is capable of receiving values for the
8 one attribute from the first and second sources; and
9   an attribute value supplier module that is capable of,
10   after the indication is received from the first source of the ability to
11 supply values for the one attribute and before the indication is received from the second
12 source, supplying to a client a value for the one attribute received from the first source,
13   after the indications are received from the first and second sources,
14 supplying to the client a value for the one attribute based on values received for the one
15 attribute from the first and second source; and
16   after the indication is received from the second source and after the
17 indication is received from the first source of the inability to supply values for the one
18 attribute, supplying to a client a value for the one attribute received from the second
19 source.

1   58.   The computing device of claim 57 wherein the attribute mapping
2 module, the attribute value receiver module, and the attribute value supplier module are
3 components of an intermediary module executing in memory, and further comprising
4 multiple sources and multiple clients executing in the memory.

1   59.   A computing device for providing information about a current state
2 that is represented with multiple modeled attributes, comprising:
3   means for receiving from a first source an indication of an ability to supply
4 values for an indicated one of the modeled attributes of the current state;

5   means for, after receiving an indication from a client for a value of the one

6 attribute, supplying to the client a value for the one attribute received from the first

7 source;

8   means for receiving from a second source an indication of an ability to

9 supply values for the one attribute;

10   means for, after receiving an indication from the client for a value of the

11 one attribute, supplying to the client a value for the one attribute based on values received

12 for the one attribute from the first and second sources;

13   means for receiving from the first source an indication of an inability to

14 supply values for the one attribute; and

15   means for, after receiving an indication from the client for a value of the

16 one attribute, supplying to the client a value for the one attribute received from the

17 second source.

1   60.   A method in a portable computer for providing information about a

2 context that is modeled with multiple context attributes, comprising:

3   receiving from each of multiple sources an indication of a current ability to

4 supply values for at least one of the context attributes of the context;

5   receiving from at least one source an indication of a current inability to

6 supply values for at least one of the context attributes of the context; and

7   after a request from a client for a value of a specified attribute,

8   determining based on the received indications if any sources are

9 currently available to supply values for the specified attribute;

10   when at least one source is determined to be currently available,

11 retrieving a value for the specified attribute that is supplied by at least one of the

12 determined sources; and

13   sending to the client the retrieved value.

1   61.   The method of claim 60 wherein the context attributes represent

2 information about a user of the portable computer.

1   62.   The method of claim 60 wherein the context attributes represent

2 information about a physical environment of the portable computer.

1   63.   The method of claim 60 wherein the context that is represented is a

2 current context.

1   64.   The method of claim 60 including:

2   after the determining if any sources are currently available to supply values

3 for the specified attribute, when it is determined that no sources are currently available,

4 indicating to the client that the requested value is not available.

1   65.   The method of claim 60 wherein the providing of the information

2 about the context is performed by a first intermediary module, and including:

3   receiving from a second intermediary module an indication of a desire to

4 perform the providing of the information about the context; and

5   in response to the received indication from the second intermediary module,

6 transferring control of the providing of the information about the context to the second

7 intermediary module.

1   66.   The method of claim 60 wherein the received indications from the

2 multiple sources of the current ability to supply values for context attributes are

3 registration messages.

1   67.   The method of claim 60 including:

2   for each received indication of a current ability to supply values for at least

3 one of the context attributes of the context, establishing continuing communications with

4 the source from whom the indication was received; and

5   for each received indication of a current inability to supply values for at

6 least one of the context attributes of the context, suspending any previously established

7 continuing communications with the source from whom the indication was received.

1   68.   The method of claim 67 wherein the sending of the retrieved value to

2 the client is in response to receiving values for the specified attribute from at least one of

3 the determined sources.

1   69.   The method of claim 60 wherein the sending of the retrieved value to

2 the client is in response to receiving of the request.

1   70.   The method of claim 69 including:

2   in response to the request,

3   sending requests to at least some of the determined sources for a value

4 of the specified attribute; and

5   receiving at least one value for the specified attribute from the

6 determined sources in response to the sent requests.

1   71.   The method of claim 60 wherein receiving of the sent value by the

2 client prompts the client to present information to a user of the client.

1   72.   The method of claim 60 including, after receiving a request from a

2 second client for a value of another attribute, sending to the second client a value for the

3 another attribute.

1   73.   The method of claim 60 wherein the retrieved value is a value

2 supplied by a first of the determined sources, and including:

3   after the sending to the client of the retrieved value, receiving from the first

4 determined source an indication of a current inability to supply values for the specified

5 attribute; and

6   after a second request from the client for a value of the specified attribute,

7 sending to the client a value that is supplied by another of the sources.

1   74.   The method of claim 60 wherein the retrieved value is a value

2 supplied by a first of the determined sources, and including:

3   after the sending to the client of the retrieved value, receiving from another

4 source an indication of a current ability to supply values for the specified attribute; and

5   after a second request from the client for a value of the specified attribute,

6 sending to the client a value that is supplied by the another source.

1   75.   A computer-readable medium containing instructions that when

2 executed cause a computing device to provide information about a context that is

3 modeled with multiple context attributes, by:

4   receiving from each of multiple sources an indication of a current ability to

5 supply values for at least one of the context attributes of the context;

6   receiving from at least one source an indication of a current inability to

7 supply values for at least one of the context attributes of the context; and

8   after a request from a client for a value of a specified attribute,

9   determining based on the received indications if any sources are

10 currently available to supply values for the specified attribute;

11   when at least one source is determined to be currently available,

12 retrieving a value for the specified attribute that is supplied by at least one of the

13 determined sources; and

14   sending to the client the retrieved value.

1   76.   A portable computer for providing information about a context that

2 is represented with multiple attributes, comprising:

3   an attribute mapping module that is capable of receiving from each of

4 multiple sources an indication of a current ability to supply values for at least one of the

5 attributes of the context and that is capable of receiving from at least one source an

6   indication of a current inability to supply values for at least one of the attributes of the

7   context; and

8   an attribute value supplier module that is capable of, after a request from a

9   client for a value of a specified attribute, determining based on the received indications if

10   any sources are currently available to supply values for the specified attribute,

11   determining a value for the specified attribute that is based on at least one value supplied

12   by at least one source determined to be currently available, and sending to the client the

13   determined value.

1   77.   A computer-implemented method for providing information about a

2   current state that is modeled with multiple state attributes, at least some of the state

3   attributes having multiple sources available to supply values for the attribute, comprising:

4   sending to an intermediary module an indication of one of the state

5   attributes;

6   receiving from the intermediary module a first value for the indicated state

7   attribute that was supplied from a first source, the first source being an only source

8   currently available to supply values for the indicated state attribute at the time of the

9   receiving of the first value;

10   after the receiving of the first value, receiving from the intermediary

11   module a second value for the indicated state attribute that was based on values for the

12   indicated state attribute supplied from the first source and from a second source, the first

13   and second sources both available to supply values for the indicated state attribute at the

14   time of the receiving of the second value;

15   after the receiving of the second value, receiving from the intermediary

16   module a third value for the indicated state attribute that was supplied from the second

17   source, the second source being an only source currently available to supply values for

18   the indicated state attribute at the time of the receiving of the third value; and

19   using at least one of the received values to perform processing based on the

20   modeled current state.

1   78.   The method of claim 77 wherein the processing includes generating
2   a value for another of the state attributes based at least in part on one or more of the
3   received values and sending an indication of the generated value to the intermediary
4   module.

1   79.   The method of claim 77 wherein the processing based on at least one
2   of the received values includes presenting information to a user.

1   80.   The method of claim 77 wherein the sent indication indicates an
2   interest in receiving values for the indicated state attribute, and wherein each of the
3   received values is sent by the intermediary module in response to the intermediary
4   module receiving at least one value for the indicated state attribute from at least one
5   source.

1   81.   The method of claim 77 wherein the sent indication is a request for a
2   value for the indicated state attribute, wherein the received first value is sent by the
3   intermediary module in response to receiving the request, and including sending second
4   and third requests to the intermediary module such that the second and third values are
5   received in response to the sent second and third requests.

1   82.   The method of claim 77 wherein security information for a source
2   must be received before any state attributes values are accepted from the source.

1   83.   A computer-readable medium whose contents cause a computing
2   device to provide information about a current state that is modeled with multiple state
3   attributes, at least some of the state attributes having multiple sources available to supply
4   values for the attribute, by:
5   sending to an intermediary module an indication of one of the state
6   attributes;

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7   receiving from the intermediary module a first value for the indicated state

8   attribute that was supplied from a first source, the first source being an only source

9   currently available to supply values for the indicated state attribute at the time of the

10 receiving of the first value;

11   after the receiving of the first value, receiving from the intermediary

12   module a second value for the indicated state attribute that was based on values for the

13   indicated state attribute supplied from the first source and from a second source, the first

14   and second sources both available to supply values for the indicated state attribute at the

15   time of the receiving of the second value; and

16   after the receiving of the second value, receiving from the intermediary

17   module a third value for the indicated state attribute that was supplied from the second

18   source, the second source being an only source currently available to supply values for

19   the indicated state attribute at the time of the receiving of the third value.

1   84.   A computing device for providing information about a current state

2   that is modeled with multiple state attributes, at least some of the state attributes having

3   multiple sources available to supply values for the attribute, comprising:

4   a first module capable of sending to an intermediary module an indication

5   of one of the state attributes; and

6   a second module capable of receiving from the intermediary module a first

7   value for the indicated state attribute that was supplied from a first source, the first source

8   being an only source currently available to supply values for the indicated state attribute

9   at the time of the receiving of the first value, of receiving from the intermediary module a

10 second value for the indicated state attribute that was based on values for the indicated

11 state attribute supplied from the first source and from a second source, the first and

12 second sources both available to supply values for the indicated state attribute at the time

13 of the receiving of the second value, and of receiving from the intermediary module a

14 third value for the indicated state attribute that was supplied from the second source, the

15 second source being an only source currently available to supply values for the indicated

16 state attribute at the time of the receiving of the third value.

1   85.   A computer-implemented method for providing information about a

2 current state that is modeled with multiple state attributes, each of the state attributes

3 having multiple sources available to supply values for the attribute, comprising:

4   sending to an intermediary module a registration message indicating an

5 ability to supply values for an indicated one of the state attributes of the modeled current

6 state;

7   receiving input information about the modeled current state;

8   generating a value for the indicated state attribute based at least in part on

9 the received input information;

10   receiving from the intermediary module a request for a value of the

11 indicated state attribute, the request sent by the intermediary module based on the

12 indicated current ability to supply values for the indicated state attribute;

13   sending to the intermediary module an indication of the generated value so

14 that the intermediary module can supply to a client a value for the indicated state attribute

15 based at least in part on the generated value; and

16   after the sending of the indication of the generated value, sending to the

17 intermediary module an unregistration message indicating an inability to supply values

18 for the indicated state attribute so that the intermediary module will refrain from sending

19 requests for values for the indicated state attribute, the refraining based on the current

20 inability to supply values for the indicated state attribute as indicated to the intermediary

21 module in the sent unregistration message.

1   86.   The method of claim 85 including generating an uncertainty value

2 associated with accuracy of the generated value, and wherein the sending of the

3 indication of the generated value includes an indication of the generated uncertainty

4 value.

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87.   The method of claim 85 including determining an effective time at which the generated value is most accurate, and wherein the sending of the indication of the generated value includes an indication of the determined effective time.

88.   The method of claim 85 wherein the received indication indicates an interest in receiving values for the indicated state attribute, and wherein the sending of the generated value to the intermediary module is in response to the receiving of the input information.

89.   The method of claim 85 wherein the received indication is a request for a value for the indicated state attribute, and wherein the sending of the generated value to the intermediary module is in response to the receiving of the request.

90.   The method of claim 85 wherein the input information is received from a sensor.

91.   The method of claim 85 wherein the sending of the registration message is based on a current ability to receive the input information about the modeled current state, and wherein the sending of the unregistration message is based on a current inability to receive the input information about the modeled current state.

92.   The method of claim 85 wherein security information for the intermediary module must be received before any state attributes values are sent to the intermediary module.

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1   93.   A computer-readable medium whose contents cause a computing

2 device to provide information about a current state that is modeled with multiple state

3 attributes, each of the state attributes having multiple sources available to supply values

4 for the attribute, by:

5   sending to an intermediary module a registration message indicating an

6 ability to supply values for an indicated one of the state attributes of the modeled current

7 state;

8   receiving input information about the modeled current state;

9   generating a value for the indicated state attribute based at least in part on

10 the received input information;

11   receiving from the intermediary module an indication of the indicated state

12 attribute, the indication sent by the intermediary module based on the indicated current

13 ability to supply values for the indicated state attribute;

14   sending to the intermediary module an indication of the generated value so

15 that the intermediary module can supply to a client a value for the indicated state attribute

16 based at least in part on the generated value; and

17   after the sending of the indication of the generated value, sending to the

18 intermediary module an unregistration message indicating an inability to supply values

19 for the indicated state attribute so that the intermediary module will refrain from sending

20 indications of the indicated state attribute, the refraining based on the current inability to

21 supply values for the indicated state attribute as indicated to the intermediary module in

22 the sent unregistration message.

1   94.   A computer system for providing information about a current state

2 that is modeled with multiple state attributes, each of the state attributes having multiple

3 sources available to supply values for the attribute, comprising:

4   a first module capable of sending to an intermediary module a registration

5 message indicating an ability to supply values for an indicated one of the state attributes

6 of the modeled current state;

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7   a second module capable of receiving input information about the modeled

8 current state and of generating a value for the indicated state attribute based at least in

9 part on the received input information; and

10   a third module capable of receiving from the intermediary module an

11 indication of the indicated state attribute, the indication sent by the intermediary module

12 based on the indicated current ability to supply values for the indicated state attribute, and

13 of sending to the intermediary module an indication of the generated value so that the

14 intermediary module can supply to a client a value for the indicated state attribute based

15 at least in part on the generated value,

16   wherein the first module is capable of, after the sending of the indication of

17 the generated value by the third module, sending to the intermediary module an

18 unregistration message indicating an inability to supply values for the indicated state

19 attribute so that the intermediary module will refrain from sending indications of the

20 indicated state attribute, the refraining based on the current inability to supply values for

21 the indicated state attribute as indicated to the intermediary module in the sent

22 unregistration message.